L6/C

NUMBER 25

Proceedings of The Canadian Phytopathological Society

Twenty-fourth Session

JUNE 24-27, 1957

UNIVERSITY OF BRITISH COLUMBIA
VANCOUVER, B. C.

NOV 18 1957

Editorial Committee
JEAN E. NEWMAN
R. A. SHOEMAKER
V. R. WALLEN
D. S. MacLACHLAN

89

COMMONWEALTH MYCOLOGICAL INSTITUTE
-5 DEC 1957

NUMBER 25

Proceedings
of
The Canadian
Phytopathological Society

Twenty-fourth Session

JUNE 24-27, 1957

UNIVERSITY OF BRITISH COLUMBIA
VANCOUVER, B. C.

Editorial Committee
JEAN E. NEWMAN
R. A. SHOEMAKER
V. R. WALLEN
D. S. MacLACHLAN

89

The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1956-57

President

R. E. FITZPATRICK, Plant Pathology Laboratory, Vancouver, B.C.

Vice-President

F. GODBOUT, Bureau de la Protection des Plantes, Montreal, P.Q.

Secretary-Treasurer

D. S. MacLACHLAN, Botany and Plant Pathology Laboratory, Ottawa, Ont.

Councillors

W. F. HANNA, Botany and Plant Pathology Division, Ottawa, Ont.
R. L. PELLETIER, Dept. of Plant Pathology, Macdonald College, P.Q.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer at a price of 50c each.

Walter Jones

It is with profound regret that I announce the death of Mr. Walter Jones on April 24, 1957. He died while visiting his original home at Glasfryn, Felinfach, Lampeter, Cardiganshire, Wales, at the age of sixty-seven.

For twenty-eight years Mr. Jones served with distinction on the staff of the Plant Pathology Laboratory at Saanichton. His investigations of plant diseases have been of inestimable value to the farmers of British Columbia. There is hardly a potato grower who has not profited by capitalizing upon Walter's intimate knowledge of potato diseases, and for years the hop growers depended upon him alone for guidance in the control of hop diseases. He has left a permanent record of his plant disease research in the form of 25 scientific papers in Canadian, English, German and American scientific journals. His papers have done much to establish the international character of biological research, for reprints of his papers have been requested by and sent to scientists in practically every country of the world.

Mr. Walter Jones had a distinguished record in World War I and was awarded the Military Medal for outstanding service. He took an active part in veterans' affairs and held many offices in the local Saanich Branch of the Canadian Legion, including the presidency. Few local groups gathered together without hearing him sing "Men of Harlech" or other of his favorite Welsh songs.

Although always particularly popular with the ladies, he remained a bachelor throughout life. He claimed that he was married to his profession, Plant Pathology. All know that his work with plant diseases was his great love.

William Newton,
Officer in Charge,
Plant Pathology Laboratory,
Saanichton, B.C.

Digitized by the Internet Archive
in 2025

https://archive.org/details/proceedings-of-the-canadian-phytopathological-society_june-24-27-1957_25

MINUTES OF THE TWENTY-FOURTH MEETING HELD AT THE UNIVERSITY OF BRITISH COLUMBIA VANCOUVER, B.C., JUNE 24-27, 1957.

Business Sessions: June 24 and June 27.

The society meetings and business sessions were held in the Education Building, University of British Columbia. Dr. R. E. Fitzpatrick welcomed the members and visitors to the Twenty-fourth Annual Meeting of the Society. In a short address, Dr. Fitzpatrick outlined the trends in publication of phytopathological literature during the past few years and gave his impressions as to the future roll of the Canadian Phytopathological Society.

The minutes of the twenty-third meeting were adopted as printed in Proceedings No. 24 on a motion by L. T. Richardson, seconded by W. P. Campbell. Carried.

It was moved by B. Peturson, seconded by W. Newton, that the Chair name three members to the Nominating Committee. Carried.

On a motion by R. S. Willison, seconded by W. D. Touzeau, it was moved that the Chair be authorized to appoint members to existing committees and to form any new committees required during the coming year. Carried.

The report of the Secretary-Treasurer was adopted on a motion by D. S. MacLachlan, seconded by L. T. Richardson.

The report of the Editorial Committee was adopted on a motion by R. A. Shoemaker, seconded by R. S. Willison. Carried.

After a lengthy discussion on the printing of the Proceedings in the future and the form which these Proceedings should take, it was moved by W. Newton, seconded by A. J. Skolko, that the Editorial Committee should follow the present policy in regard to the printing of the Proceedings. Carried.

The report of the Terminology Committee was adopted on a motion by M. F. Welsh, seconded by G. H. Berkeley. Carried.

The report of the Representative of the Canadian Society of Microbiologists was adopted on a motion by R. E. Fitzpatrick, seconded by L. T. Richardson. Carried.

The report of the Nominating Committee was adopted on a motion by D. S. MacLachlan, seconded by R. Stace-Smith. Carried.

The following applications for membership in the Society were approved unanimously on a motion by B. Peturson, seconded by G. E. Woolliams. Carried.

D. E. Etheridge	A. C. Molnar
P. K. Isaac	Maria Pantidou
M. Lortie	M. C. J. van Aldrichem
N. A. MacLean	R. W. Walsh
J. A. Moisey	R. E. Webb

The report of the Custodian of the Library and Records was adopted on a motion by B. Peturson, seconded by J. B. Lebeau. Carried.

It was moved by W. C. Broadfoot, seconded by W. P. Campbell that an honorarium of twenty-five dollars be granted to the Secretary-Treasurer and the President for stenographic assistance. Carried.

The report of the Program and Publicity Committee was adopted on a motion by H. N. W. Toms, seconded by W. D. Touzeau. Carried.

The report of the Resolutions Committee was adopted on a motion by R. S. Willison, seconded by H. N. W. Toms.

A letter from George W. Robertson, suggesting that the Canadian Phytopathological Society hold a joint session with other affiliated Societies on the subject of Agrometeorology was read to those assembled. After some discussion

it was moved by W. Newton, seconded by W. C. Broadfoot, that the decision as to whether or not such a session be held should be left to the discretion of the incoming Executive. Carried.

It was moved by W. Newton, seconded by W. C. McDonald, that the Executive appoint a Representative to the Editorial Board of the Canadian Journal of Plant Science. Carried.

COMMITTEES

Auditors: Mildred K. Nobles and J. W. Groves.

Editorial: Jean Newman (Chairman), V. R. Wallen, R.A. Shoemaker, D. S. MacLachlan.

Nominating: R. E. Fitzpatrick (Retiring President as Chairman), W. F. Hanna, W. L. Gordon, D. B. Robinson, R. Lachance.

Program and Publicity: R. G. Ross (Chairman), J. Monro, G. W. Ayers, D. B. Robinson, D. S. MacLachlan.

Representative to the Canadian Society of Microbiologists: A. R. Walker.

Resolutions: R. S. Willison (Chairman), J. M. Wilks, B. Peturson.

Terminology: M. F. Welsh (Chairman), W. A. F. Hagborg, B. H. MacNeill, H. M. Good, T. C. Vanterpool, R. S. Willison, R. A. Ludwig, W. E. McKeen, C. D. McKeen, D. J. MacLeod, R. Pomerleau, L. E. Tyner, A. W. Henry, A. N. Langford.

Regional Representatives:

Maritimes	—	J. Monro
Eastern Quebec	—	D. Leblond
Western Quebec	—	F. Godbout
Eastern Ontario	—	R. J. Baylis
Western Ontario	—	B. H. MacNeill
Manitoba	—	W. C. McDonald
Saskatchewan	—	R. D. Tinline
Alberta	—	E. J. Hawn
B. C. Mainland	—	R. Stace-Smith
Vancouver Island	—	R. E. Foster

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members :

I have the honor of presenting the following report for the fiscal year ending May 31, 1957.

The 23rd Annual Meeting of the Society was held at the University of Toronto, Toronto, Ontario, June 25-28, 1956. An account of the business sessions, abstracts of the 20 papers presented, and the text of Dr. Waggoner's paper entitled "Weather and Plant Diseases", are included in the C.P.S. Proceedings No. 24.

The C.P.S. Banquet was held on June 26, in Hart House, University of Toronto. Following the banquet Dr. Paul E. Waggoner presented his paper "Weather and Plant Diseases".

Membership in the Society now stands at 220.

The attached financial statement shows a favorable balance of $169.63.

Respectfully submitted,

D. S. MacLachlan,
Secretary-Treasurer.

FINANCIAL STATEMENT

CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1956 to May 31, 1957

Revenue :

Balance brought forward			262.16
Fees :			
1954-55	$ 10.00		
1955-56	99.00		
1956-57	187.00		
1957-58	26.00		
1958-59	2.00		
		324.00	
Bond interest		15.00	
Sale of Proceedings		24.02	
			363.02
			625.18

Expenditures :

Dr. Paul Waggoner - expenses	25.00	
Banquet	44.00	
Honorarium — stenographic	15.00	
Printing of Proceedings #24	264.00	
Postage	43.50	
Printing — Banquet tickets, etc.	39.05	
H. T. Güssow — expenses	25.00	
		455.55
Balance (on hand) May 31, 1957		169.63

Additional Asset :

Dominion of Canada Bond (Series P 7Z95546)	500.00

Audited and found correct.

(Signed) J. W. Groves,

Mildred K. Nobles

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

Following the adoption of the report of the custodian of the library presented at the twenty-third session of the Society in June, 1956, the regional representative of the society for Manitoba, Dr. W. C. McDonald, the custodian, and the librarian of the Plant Pathology Laboratory, Winnipeg, examined the contents of the Phytopathological Society Library with regard to its disposal. After due consideration of the contents, certain items of non-pathological and botanical interest were discarded and approximately sixty other items were taken from it and placed in the Library of the Plant Pathology Laboratory at Winnipeg. Acting on the suggestion made by the Secretary-Treasurer, Dr. D.S. MacLachlan, that unwanted items in the library would undoubtedly be welcomed by the Agricultural College in Athens, Greece, the remainder of the Society Library has recently been sent to Dr. MacLachlan for shipment there.

W. L. Gordon.

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the twenty-third session of the Canadian Phytopathological Society was issued on December 5, 1956. It contains the report of the meeting held at the University of Toronto, Toronto, Ontario, June 25-28, 1956, abstracts of nineteen papers and three titles of papers presented at the meetings, a list of papers published by members of the Society between June 1, 1955 and May 31, 1956, and an obituary of Dr. D. C. Buckland.

The invitation paper presented by Dr. P. E. Waggoner of the Department of Climatology, The Connecticut Agricultural Experiment Station, was published in full in Proceedings No. 24 and the paging arranged so that separate reprints of this paper could be obtained.

Unfortunately, no photograph of the members attending the meetings was taken and therefore could not be included in the Proceedings.

The Committee would appreciate some expression of opinion from the Society on the policy to be followed in future publication of the Proceedings. The Publications Committee has, in Proceedings No. 24, recommended some changes in policy but no expression of opinion on this matter has been received from the membership by the Editorial Committee.

Jean E. Newman
V. R. Wallen
D. S. MacLachlan
Ruth Horner Arnold (Chairman)

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee of the Canadian Phytopathological Society has agreed unanimously on the following nominations to office for the year 1957-58:

President:	A. J. Skolko
Vice-President:	M. W. Cormack
Councillors:	D. R. Redmond
	R. E. Fitzpatrick

Respectfully submitted

W. C. Broadfoot
R. J. Baylis
R. O. Lachance
W. A. Hodgson
W. F. Hanna (Chairman)

REPORT OF THE PROGRAM AND PUBLICITY COMMITTEE

The Committee which consisted of W. D. Touzeau, W. E. McKeen, W. Newton, D. S. MacLachlan and H. N. W. Toms held no formal meetings during the year but kept in touch by correspondence and telephone conversations.

In furtherance of two motions passed at the 1956 Annual Meeting a letter was sent to the Secretary-Treasurer of the A.P.S. (Pacific Division) inviting members of that Society to attend the next C.P.S. Meeting in Vancouver, also abstracts of papers to be given at the present Meeting were mimeographed for distribution.

As usual, the bulk of the correspondence and onus of the program arrangements fell on the shoulders of the Secretary, Dr. MacLachlan, who also worked with the

Agricultural Pesticide Technical Society in planning that Joint Session. The Chairman completed all strictly local arrangements.

Upon recommendation of the Committee the President, Dr. Fitzpatrick invited Dr. Cecil E. Yarwood of the University of California to be Guest Speaker for the Meeting and Dr. H. T. Güssow to be Guest Speaker for the annual banquet. The Secretary was requested to make arrangements within the Department of Agriculture and within the Society with respect to certain financial matters concerning the Guest Speaker.

The Committee expresses its appreciation for the co-operation and help it received from the Program Committee of the A.I.C. and from the Division of Botany and Plant Pathology of Science Service.

H. N. W. Toms (Chairman)

REPORT OF THE REPRESENTATIVE TO THE CANADIAN SOCIETY OF MICROBIOLOGISTS

The Seventh Annual Meeting of the Canadian Society of Microbiologists was held at the University of Western Ontario, London, June 17-19. The registration was 134.

Thirty-five papers were presented. These included some on fungi, soil microbiology, toxicity in blue green algae, and hydrolysis of agar as well as the more conventional bacteriological subjects. One session was devoted to talks and demonstrations dealing with morphological and cytological studies of bacteria and fungi.

Dr. C. E. Van Rooyan is President-elect, and Professor J. A. Carpenter, of Guelph, is Secretary-Treasurer.

The Society is in a healthy financial position. It has 379 paid-up members and a cash balance of $2,215.00. It now feels prepared to plan for incorporation. Such action would greatly facilitate the preparations for the VIII Congress of the IAMS which we expect will be held in Montreal in 1962.

The Journal continues to attract papers of fine quality. These are mostly from Canada, but a few are of foreign origin. Six numbers appear per year, with an average of about 15 papers each. The current circulation is 1176, compared with about 1000 last year and 750 the previous year. A good proportion of the circulation is to people outside of Canada — 372 to U.S.A. and 338 to more remote foreign countries.

The Society recently honored two of its well known members. A supplementary issue of the Journal was dedicated to Professor E.G.D. Murray in 1956 in recognition of his contributions to Science, and during 1957 a similar issue was dedicated to Dr. A. G. Lochhead. In each case a special bound volume was presented to the recipient of the honor.

Some Canadian biologists have suggested the desirability of closer liaison among the various groups of workers with biological interests. The Microbiologists are in sympathy with this idea and suggest an early meeting of representatives of the various biological groups to explore the possibility of closer co-ordination.

The Microbiologists will hold their Eight Annual Meeting at Dalhousie University, Halifax, June 18-21, 1958. This is the latter part of the week previous to the A.I.C. meetings at Wolfville. It is planned to hold the 1959 meetings in Ottawa either just before or just after the International Botanical Conference in Montreal.

Respectfully submitted,

A. R. Walker.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas the Canadian Phytopathological Society has held its 24th session at the University of British Columbia June 24-27, 1957, in conjunction with the annual meeting

and convention of the Agricultural Institute of Canada, and whereas the accommodations and facilities placed at the disposal of the Society have contributed notably to the success of the sessions.

Be it resolved that we extend our sincere appreciation to :

1. Our hosts, the Vancouver Branch of the Agricultural Institute of Canada.
2. The University of British Columbia for making available their excellent facilities.
3. Mr. H. N. W. Toms, chairman, and members of the program committee for making arrangements for the meetings in the Education Building, University of British Columbia, and for the annual banquet in Brock Memorial Building, University of British Columbia.
4. Dr. H. T. Güssow for his address "The Birth of the Canadian Phytopathological Service" presented at the annual banquet.
5. Dr. C. E. Yarwood for his invitation paper entitled "Mechanical Transmission of Plant Viruses".
6. D. L. McIntosh, E.C. Hughes, R. M. Adamson, J. E. Bosher, J. E. Bier, N. F. Putnam, R. Glen for their invitational papers presented at the joint session of the Agriculture Pesticide Technical Society and Canadian Phytopathological Society under the chairmanship of G. E. White.

B. Peturson
J. M. Wilks
R. S. Willison (Chairman)

REPORT OF THE TERMINOLOGY COMMITTEE

The manuscript of "Definitions of Terms in Forest and Shade Tree Diseases", compiled by D. C. Buckland, D. R. Redmond and R. Pomerleau, was submitted for publication in the Canadian Journal of Botany as directed by the Society at the 1956 meetings. It has been accepted by the Journal, and is expected to appear in the September, 1957 issue. 2000 reprints have been ordered. The Canadian Institute of Forestry has granted a maximum of $20.00 toward the cost of these reprints, but costs will be shared equally by the two Societies.

The review of terminology for plant virus diseases is still in the final stage of revision. When this revision is complete it will be submitted for approval to all members of the committee and submitted for publication in the Canadian Journal of Botany.

W. A. F. Hagborg
B. H. MacNeill
H. M. Good
T. C. Vanterpool
R. S. Willison
R. A. Ludwig
W. E. McKeen
C. D. McKeen
D. J. MacLeod
R. Pomerleau
L. E. Tyner
A. W. Henry
A. N. Langford
M. F. Welsh (Chairman)

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-FOURTH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

STUDIES ON THE PARASITISM OF CRYPTODIAPORTHE CANKER ON WILLOW

J. E. Bier, University of British Columbia, Vancouver, B.C.

Salix sp. in the University Endowment Lands, Vancouver, are severely affected with a canker disease caused by *Cryptodiaporthe salicina* (Curr.) Wehm. Studies on disease development have demonstrated a close relationship between canker growth and moisture content of the bark. During the dormant season the moisture content of the bark is low (50 - 55 per cent) and trees are highly susceptible to attack. Physiological studies have shown that the minimum temperature for fungus growth occurs below the average temperature for the winter months in Vancouver. When dormancy breaks, the moisture content of the bark increases to 65 - 70 per cent which would appear to restrict further canker growth.

THE USE OF VARIOUS PESTICIDES FOR THE CONTROL OF NEMATODES IN BRITISH COLUMBIA

J. E. Bosher, Plant Pathology Laboratory, Saanichton, B.C.

Evidence has been obtained that soil fumigation is most effective in the coastal regions of B.C. during the fall period when soil temperatures are highest. The survival of endoparasitic nematodes is greatest when living root tissues are present in the soil at time of treatment. Methyl bromide (MC_2) was effective in the treatment of stony soils where mechanical difficulties reduced the efficiency of injected fumigants. Nemagon applied in the root-zone of apple stocks at the period of plant dormancy in the fall and during active growth in the summer greatly reduced but did not eradicate populations of *Pratylenchus penetrans*. Phytotoxic effects were observed only at dosage rates much in excess of normal when applied in the summer.

VARIETAL DIFFERENCES IN REACTION OF BARLEY TO *CLAVICEPS PURPUREA* (Fr.) Tul.

W. P. Campbell, Plant Pathology Laboratory, Edmonton, Alberta.

Eleven varieties of barley have been tested in the greenhouse and field for susceptibility to infection by *Claviceps purpurea* (Fr.) Tul. Inoculation in the field was carried out by spraying the plants with an aqueous suspension of conidia. In the greenhouse the plants were inoculated by injecting the spore suspension into the florets with a hypodermic syringe. The inoculations were carried out on the day the plant headed and every second day thereafter for ten days. Good agreement was found between the two methods. The length of time during which the host was susceptible following heading seemed to have an important bearing on the amount of infection found in the field.

SYMPTOMS OF SOUR CHERRY YELLOWS AND NECROTIC RING SPOT IN RELATION TO TIME OF INFECTION

T. R. Davidson and J . A. George, Plant Pathology Laboratory, St. Catharines, Ontario.

Virus-free Montmorency cherry trees were inoculated monthly with an isolate of cherry yellows or necrotic ring spot virus to determine if a relationship existed between the time of inoculation and the symptoms expressed that could be used to indicate when natural infections occur. Differences in the initial symptom patterns were noted. With cherry yellows, shock symptoms developed in all treatments while necrotic ring spot caused shock or etch symptoms. The only variation in the shock symptoms was their location in relation to the point of inoculation. Therefore, unless the point of infection was known the progress and location of shock was of no value in determining the time of infection.

THE EFFECT OF MOISTURE CONTENT, SPECIFIC GRAVITY, AND WIDTH OF THE ANNUAL RINGS ON DECAY IN SUBALPINE SPRUCE

D. E. Etheridge, Forest Pathology Laboratory, Calgary, Alberta.

The moisture content in subalpine spruce was highest in overstorey trees and lowest in understorey trees, and it was higher in trees on a moist site than in trees of similar vigor classes on a dry site. Moisture contents of 10% of saturation for the more vigorous trees on the moist site and 7% of saturation for the less vigorous trees on the dry site represented a statistically significant difference which appeared to restrict the development of fungi in the heartwood to the wetter trees. A similar difference in the moisture content existed between the butt and 20 ft. level of the trees, the occurrence of fungi being restricted to the wetter basal portion of the stems. In the laboratory, infection did not take place in test-blocks at moisture contents lower than 8% of saturation. It is suggested that the threshold moisture content for infection in the trees occurs around the 7 to 8% saturation level. In the laboratory tests, a difference in the moisture content of 3.4% of saturation in wood resulted in a statistically significant difference in the rate of decay by *Coniophora puteana* (Schum. ex Fr.) Karst., but differences in ring-frequency and specific gravity in the test pieces corresponding to the differences between these properties in the living trees, did not appreciably affect the decay rate. There was no evidence that variations in the distribution of decay-promoting or decay-retarding substances occurred in the trees from the two sites.

SELF-FERTILITY IN THE SCLEROTINIACEAE

J. W. Groves, Constance A. Bowerman, and Mary E. Elliott,

Botany and Plant Pathology Laboratory, Ottawa, Ontario.

Self-fertility has been demonstrated in nine species of the Sclerotiniaceae distributed through five genera. These include *Ciboria acerina* Whetz. & Buchwald, *C. amentacea* (Balb.) Fckl., *C. caucus* (Reb.) Fckl., *Ciborinia erythronii* (Whetz.) Whetz. *Rutstroemia paludosa* (Davidson & Cash) n. comb., *Septotinia podophyllina* Whetz., *Verpatinia calthicola* Whetz. and two undescribed species of *Ciboria*, one occuring on male catkins of *Betula* and *Ostrya*, the other on old leaves of *Acer*, *Ulmus*, and possibly *Fraxinus*.

HISTOLOGICAL STUDIES ON CROWN BUD ROT OF ALFALFA

E. J. Hawn, Science Service Laboratory, Lethbridge, Alberta.

Confirmation of the roles of *Rhizoctonia solani* Kühn, *Fusarium avenaceum* (Fr.) Saac, *Fusarium acuminatum* Ell. & Ev., and *Ascochyta imperfecta* Pk. in causing crown bud rot of alfalfa was obtained through microscopic examination of artificially inoculated crown buds. Sections of diseased tissue stained with Conant's Quadruple Stain showed identifiable mycelium and fruiting structures of the aforementioned fungi.

Mycelium of *R. solani* ramifies the crown buds inter- and intracellularly. *F. avenaceum* and *F. acuminatum* cause disorganization and death of the host cells in advance of the mycelium — probably through the action of toxic metabolites. The mode of action of *A. imperfecta* is not yet clear.

A PHYTOPHTHORA ROOT AND STALK ROT OF SOYBEANS

A. A. Hildebrand, Science Service Laboratory, Harrow, Ontario.

A serious root and stalk rot of soybeans in southwestern Ontario is caused by a species of *Phytophthora* tentatively identified as *P. megasperma*. The first serious outbreak of the disease in 1954 was coincident with the widespread planting of the new, highly susceptible variety, Harosoy. Other varieties including Monroe are

virtually immune to the disease. Though more serious from May to mid-July, the disease can attack and kill plants throughout the growing season. In culture the pathogen grows at temperatures ranging from 7.5 to 32.5°C., with optimum growth at 25°C. By artificial inoculation it has been shown that certain varieties of snap and dry beans, and of lima beans are susceptible to the soybean pathogen.

SNOW MOLD OF FORAGE CROPS IN ALASKA AND YUKON

J. B. Lebeau, Plant Pathology Laboratory, Edmonton, Alberta.

Eight days were spent examining overwintering damage to forage crops in Alaska and Yukon. A distance of approximately 1,200 miles was covered on this survey and 28 samples of diseased plants were taken at various locations throughout these territories. Isolations of the low-temperature organisms were made from these samples at the Science Service Laboratories at Edmonton and Lethbridge. The low-temperature pathogens isolated were: *Sclerotinia borealis* Bubak & Vleugel, *Plenodomus meliloti* Mark.-Let., and a low-temperature basidiomycete which is the principal snow-mold pathogen in western Canadian. Many additional organisms were recovered from the samples including several *Fusarium* spp.; however, the above mentioned were the only ones identified as low-temperature pathogens. This was the first time that the low-temperature basidiomycete has been found beyond the Canadian border. It was apparent that a large percentage of the winter-killing of herbaceous plants in Alaska and Yukon was caused by these low-temperature pathogens.

FACTORS INFLUENCING THE RELATIONSHIP BETWEEN VIRUSES OF WILD PLANTS AND CULTIVATED PLANTS

D. MacClement and M. Richards, McMaster University, Hamilton, Ont.

Almost all wild plants sampled so far have at some time been shown to contain viruses. These viruses include many economically important in cultivated crops. They show cycles of availability; seasonally, annually and on a long term cycle of several years. Factors influencing these cycles include weather, insect population and variations within the virus complex. The transfer of viruses from cultivated crops to both weed and wild plant populations has been established and the return from these to crops is indicated. A sampling area is being sought having a minimum influence from the viruses in cultivated crops.

THE *PSEUDOPLEA-PLEOSPORA* COMPLEX ON ALFALFA

W. C. McDonald, Plant Pathology Laboratory, Winnipeg, Manitoba.

Cultural and pathogenic studies with the alfalfa pathogens *Stemphylium botryosum* and *Pseudoplea trifolii* have shown that, contrary to a recent report from Minnesota, these two fungi are separate species. Cultures of *P. trifolii* isolated from alfalfa in Manitoba were similar to isolates received from Minnesota, Wisconsin, and Pennsylvania. No conidia of *S. botryosum* were ever observed in any of these cultures. Isolates of *S. botryosum* from Manitoba produced mature ascospores of *Pleospora herbarum* on natural and synthetic media. These results agree with the previously accepted situation in respect to the taxonomy of these fungi.

A method of inoculating alfalfa with ascospores of *P. trifolii* was developed. Mature ascospores were produced in 5 to 10 days by isolates grown on V-8 juice agar at a temperature of 60°F. in light. Typical Pseudoplea leaf spots developed 48 hours after sporulating petri dish cultures were inverted over healthy, detached alfalfa leaves floating in distilled water or over mature plants in a humidity chamber. In pathogenicity tests with *S. botryosum* at least four days were required before symptoms appeared on the leaves. Ascospores of *P. trifolii* penetrate directly through

the epidermis while conidia and ascospores of *P. herbarum* penetrate through stomata usually.

Detached leaves inoculated with both organisms bear perithecia of both fungi intermingled in the dead areas along with conidia of *S. botryosum.*

MORTALITY OF *PINUS RADIATA* IN NEW ZEALAND

F. J. Newhook, New Zealand Dept. of Agriculture, Auckland.

A serious disease is causing a heavy loss in *Pinus radiata* shelter belts in many districts of the North Island of New Zealand. Groups of mature trees die rapidly in spring and early summer following abnormally wet winters. The conditions appears to be a wilt following attack by *Phytophthora cinnamomi* on absorbing rootlets. The fungus was present in 25-63% of soil samples from affected hedgerows, but in only 0-6% from healthy hedgerows. Grid sampling showed that the fungus is absent or rare in open fields but is highly concentrated in the fibrous root zone of the trees.

P. cinnamomi is present in some of the major pine plantations in New Zealand, while an apparently new species of *Phytophthora* has been isolated from another. They may account for some of the widespread mortality in North Island pine plantations which has formerly been attributed to competition and suppression, since death of many dominant trees is now a feature of some of these *P. radiata* forests.

THE FORMATION OF A YELLOW PIGMENT BY *PHYTOPHTHORA INFESTANS* IN THE PRESENCE OF *P*-AMINO BENZOIC ACID

W. Newton, Plant Pathology Laboratory, Saanichton, B.C.

Phytophthora infestans develops a bright yellow pigment in the presence of *p*-amino benzoic acid when growing on oatmeal agar plates. *P. cactorum* from collar-rot lesions, *P. parasitica* from tomato-rot lesions, and *P. parasitica* var. *nicotianae* from tobacco do not produce this color reaction under comparable growth conditions, hence the color reaction might be of value in studying the metabolic products of *P. infestans.*

PHYSIOLOGIC RACES OF CROWN RUST IN CANADA 1929 TO 1956

B. Peturson, Plant Pathology Laboratory, Winnipeg, Manitoba.

Annual surveys have been made since 1929 to determine the identity, prevalence and distribution of the races of crown rust *(Puccinia coronata avenae* Erikss.) that occur in Canada.

Forty-five races and biotypes were identified from 3022 collections studied. Prior to 1945, nearly all the isolates obtained belonged to races non-pathogenic to varieties possessing the Bond type of crown rust resistance. In 1945, races pathogenic to these varieties began to increase and since 1950 they have comprised about 60% of all isolates. The increase in these races in Canada coincided with a greatly expanded acreage grown to varieties possessing the Bond type of resistance in the U.S.A.

Races 239 and 240, which are non-pathogenic to Bond, are the most prevalent ones in Eastern Canada. Races 201, 202 and 202A, which are pathogenic to Bond, are the predominant races in Western Canada and they also occur commonly in Eastern Canada but are somewhat less prevalent there than races 239 and 240.

In 1956, race 263 was found in two localities and race 276 in one locality in Canada. Both these races are of especial importance because they are pathogenic to all the oat varieties presently being used in breeding for crown rust resistance by Canadian plant breeders.

A METHOD OF DETERMINING THE DEGREE OF VIABILITY OF A POPULATION OF POTATO RING ROT BACTERIA

L. T. Richardson, Science Service Laboratory, London, Ontario.

A turbidimetric method for determining quantitatively the viability of *Corynebacterium sepedonicum* populations was developed for use in eradication studies on bacterial ring rot of potatoes. The lag period in the growth curve of surviving bacteria incubated in a liquid medium, derived from periodic turbidity measurements, was used as an index of viability.

By this method it was demonstrated that ring rot bacteria can survive on dry jute for six months at normal storage temperatures with virtually no loss in viability and that mortality is not complete after six months at 28°C.

The effects of higher temperatures on viability were also shown, a 10-minute exposure to 55°C. in liquid medium or 125°C. in dry air (150°C. for bacteria carried on jute fibers) being required to achieve complete kill.

The effects of different concentrations of two gaseous fumigants on viability of ring rot bacteria on jute were determined, none surviving an 18-hour exposure to mixtures containing 2% ethylene oxide by volume in air or 20% methyl bromide.

BIOLOGY OF SOME GRAMINICOLOUS SPECIES OF *HELMINTHOSPORIUM*

R. A. Shoemaker, Botany and Plant Pathology Laboratory, Ottawa, Ontario.

The position of *Helminthosporium* conidial states in the life cycle of 4 species of *Pyrenophora* parasitic on grasses was confirmed. Cultures derived from single ascospores of *Pyrenophora* species were compared with monoconidial isolates of *Helminthosporium* species on a standard minimal medium. The biological connection was successfully demonstrated between *Pyrenophora bromi* (Died.) Drechs. and *Helminthosporium bromi* (Died.) Died., *P. avenae* Ito & Kurib. in Ito and *H. avenae* Eidam, *P. teres* Drechs. and *H. teres* Sacc., *P. tritici-repentis* (Died.) Drechs. and *H. tritici-repentis* (Died.) Died.

SEED AND SEEDLING INFECTION OF BARLEY BY *RHYNCHOSPORIUM SECALIS*

W. P. Skoropad, Plant Pathology Laboratory, Edmonton, Alberta.

Seed transmission of *Rhynchosporium secalis,* the cause of barley scald, has been shown recently. The awns and seed coats were infected readily under field and under greenhouse conditions. Infection occurred almost invariably on the inside of the lemma and on the adjacent pericarp.

The coleoptiles emerging from diseased seed were infected as they brushed past the lesioned lemma. Warm soil temperatures were detrimental to seedling infection.

Seed treatment with Ceresan M, Orthocide 75, formaldehyde, or a water soak for 48 hours indicated good control of the scald organism on the seed.

VIRUS DISEASES OF GRASSES IN EUROPE

J. T. Slykhuis, Botany and Plant Pathology Laboratory, Ottawa, Ontario.

In addition to cocksfoot mosaic and cereal yellow dwarf which were already known, three viruses were recognized on cereal and forage grasses in England in 1956. Barley false stripe was found on barley grown from seed obtained in France. A mosaic disease on rye-grass was assigned to a virus transmitted manually and with difficulty by an eriophyid mite. The cause of a discease similiar to wheat striate mosaic proved to be a virus transmitted by a fulgorid, *Delphacodes pellucida* (F).

A survey of grass viruses in western and northern Europe was made in April and May, 1957. Cocksfoot mosaic and rye-grass mosaic were observed in France, Holland, Germany, Denmark, Sweden and Finland, but not in Norway. Symptoms of cereal yellow dwarf were observed in winter cereals and/or perennial grasses in all the above countries except Denmark. Barley false stripe was identified in barley varieties in a world collection grown at Gatersleben, Germany. The English type of cereal striate mosaic was found in Germany and Denmark.

STUDIES OF PYTHIUM ROT OF *SAINTPAULIA*, THE AFRICAN VIOLET

H. S. Thompson, Botany and Plant Pathology Laboratory, Ottawa, Ontario.

Pythium ultimum Trow isolated from African violets affected with root and crown rot was found to be capable of causing a decay of *Saintpaulia* leaf cuttings and rooted cuttings. Infection and decay occurred over a wide range of soil moisture and were not limited by any soil temperature with the range of 10° to 30°C. Plants in contaminated soil remained healthy but became predisposed to attack by prolonged exposure to light of very high intensity or by being infested with nematodes. Young plants large enough to be planted singly in soil but maintained for a prolonged period in vermiculite became infected and completely decayed when planted in contaminated soil.

PREVENTION OF LITTLE CHERRY SPREAD IN NEW AREAS

M. F. Welsh, J. M. Wilks and W. H. A. Wilde, Plant Pathology Laboratory, Summerland, B.C.

Although little cherry research has been directed especially toward solution of the problem within the Kootenays, the information accumulated has provided promising measures that can be used to reduce the threat of this disease in other areas to which it may spread. Such measures include eradication of the wild cherry as well as of diseased trees in the orchards; use of specific indicator hosts to accelerate identification of diseased trees; use of insecticide programs and cover crop practices to reduce orchard insect populations; and imposition of embargoes on movements of fruit, boxes and vehicles from affected orchards or districts.

LEAF PUCKER — A VIRUS DISEASE OF APPLE

M. F. Welsh and F. W. L. Keane, Plant Pathology Laboratory, Summerland, B.C.

Relatively little is known of the role of viruses in pomaceous fruits in British Columbia. During the last two years experiments have been initiated that should allow their importance to be assessed. As an initial step a number of disorders of unknown origin are being subjected to graft transmission tests. As a stimulating and perhaps auspicious beginning, the first disorder so tested has proved to be transmissible. The disease causes puckering and yellow flecking of leaves of McIntosh apple, accompanied by fruit distortion. Foliage symptoms have appeared in inoculated McIntosh and Spartan, but not Winesap and Jonathan.

PEAR DECLINE IN THE PACIFIC NORTHWEST

C. G. Woodbridge, E. C. Blodgett and T. O. Diener, State College of Washington and Washington State Department of Agriculture Pullman and Prosser

In the State of Washington and in British Columbia a problem in pear culture of considerable economic importance is referred to as pear decline. Two types designated as quick decline and slow decline are easily distinguishable. The former is characterized by a rapid wilting of the leaves followed by death of the affected tree; the latter by a loss of vigor and reduced growth over a period of years. The cause or causes of pear decline are not known.

GERANIUM STEM-END ROT

G. E. Woolliams, Plant Pathology Laboratory, Summerland, B.C.

Basal stem rots in *Pelargonium* cuttings cause losses that range widely in different varieties. Rotting is most common in cuttings made in the late autumn. A dark brown rot, which is most common, is caused by *Botrytis cinerea;* and a black rot by *Pythium ultimum.* Rot control has been secured by (a) preparing cuttings early in September, and (b) dipping freshly prepared cuttings early into two per cent Ferbam or Thiram dusts. Combination of one per cent Agrimycin with the dusts increased disease control and root formation. Dipping cuttings in spray suspensions was useless.

ABSTRACT OF THE INVITATION PAPER
MECHANICAL TRANSMISSION OF FRUIT TREE VIRUSES

C. E. Yarwood, University of California, Berkeley, California.

Our knowledge of the transmissibility of fruit tree viruses has been advanced through the following steps: proof by grafting of the infectious nature of peach yellows (5), transmission of peach yellows from peach to peach by the insect *Macropsis trimaculata* (2), dodder transmission of a virus from peach rosette to herbaceous plants (3), juice transmission of a virus from cherry to cucumber (4), juice transmission of apple mosaic virus to herbaceous plants (6), juice transmission of yellow bud mosaic virus from cowpea to peach (7), and insect transmission of yellow leaf roll virus from celery to peach (1). At present, a minimum of 3 and a maximum of about 9 distinct fruit tree viruses have been transmitted mechanically to fruit trees, and several more have been transmitted to herbaceous plants only. Most mechanical inoculations with fruit tree viruses still fail, and better methods are needed.

If we accept rubbing donor host juice on to a suscept which has been dusted with an abrasive as a standard method of inoculation, some of the factors which are believed to influence the success of inoculations with fruit tree viruses are as follows:

1. *Choice of inoculum.* Young, succulent leaf tissue in the spring of the year is usually best as original inoculum. Twig tissues of dormant trees in winter have served as successful inocula with Tulare apple mosaic virus, peach yellow bud mosaic virus, and peach ring spot virus, but were less infective than young leaf tissue. Petal tissue has been better than leaf tissue in a few cases. Tissue of herbaceous donor hosts has been more infective than fruit tree tissue. The upper epidermis of infected tobacco has been a richer source of apple mosaic virus than has the lower epidermis.

2. *Choice of suscept.* Herbaceous plants such as cucumbers, squash, bean, tobacco, guar, cowpea, and chenopodium are usually more readily infected with fruit tree viruses than are fruit trees. Whether herbaceous plants or trees are used, very young plants are more susceptible than older plants. With most virus-host combinations, better infection results if the inoculum is applied to the upper leaf surface. With peach yellow bud mosaic virus, inoculations on peach and sunflower were more successful if made on the lower leaf surface, and upper stems, than if made on the upper leaf surface.

3. *Longevity and activity of the virus.* Fruit tree viruses are usually shorter-lived than are those of herbaceous plants. Extraction of juice from fruit trees is frequently difficult or impossible with ordinary facilities, and even if secured such extracts are likely to be non-infectious. The longevity and/or the infectivity of the virus may be increased by extracting the donor juice with water, or with aqueous solutions of dipotassium phosphate, sodium sulfite, or cysteine hydrochloride. Loss of infectivity with time may sometimes be avoided by two types of quick inoculation. In one, the cut edges of leaves of the donor host are rubbed directly on the suscept, and in the other a stiff brush is stroked over the donor host and then over the suscept.

By these methods, the time from extraction of the virus from the donor host till its introduction into the cells of the suscept may be less than 3 seconds.

4. *Water effect.* With inoculations of apple mosaic virus and peach yellow bud mosaic virus to bean and cowpea, heavier infection has resulted if the inoculated surface was dried quickly after inoculation.

5. *Heat effect.* When bean or cowpea leaves were heated for about 20 seconds at 50°C. before or several hours after inoculation, infection with several viruses was increased. Heating before inoculation increased numbers and size of lesions. Heating after inoculation increased numbers and size of lesions, delayed the necrosis due to virus infection, and increased the numbers of systemic infections. Heat effects have been most studied and most successful with viruses of herbaceous plants, but heating plants before inoculation has greatly increased infection with apple mosaic virus, and the only two cases of juice transmission of apple mosaic virus to apple were on trees which were heated before inoculation. When peaches infected with peach yellow bud mosaic virus or peach ring spot virus were held at over 85°F., no symptoms appeared in the new growth.

6. *Diurnal periodicity.* Inoculations of apple mosaic virus, peach yellow bud mosaic virus, and peach ring spot virus have been more successful if made in the afternoon than if made in the early morning. It is suspected that this is due to diurnal variation in the susceptibility of the host, but diurnal variation of the virus has not been excluded.

References

(1) Jensen, D.D. Insect transmission of virus between tree and herbaceous plants. Virology, 2, 249-260 (1956).

(2) Kunkel, L. O. Insect transmission of peach yellows. Contrib. Boyce Thompson Inst. 5, 19-28 (1933).

(3) Kunkel, L. O. News hosts as a key to progress in plant virus research. IN Virus Diseases. Cornell Univ. Press. pp. 63-82. (1943).

(4) Moore, J. P., Boyle, J. S., and Keitt, G. W. Mechanical transmission of a virus disease to cucumber from sour cherry. Science, 108, 623-624. (1948).

(5) Prince, W. A. short treatise on horticulture. New York. pp. 14-15. 1928.

(6) Yarwood, C. E. Mechanical transmission of an apple mosaic virus. Hilgardia, 23, 613-628. (1955).

(7) Yarwood, C. E. Mechanical transmission of peach yellow bud mosaic virus. Plant Disease Reptr. 40, 299. (1956).

LIST OF PAPERS PUBLISHED BY MEMBERS OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

Between June 1, 1956 and May 31, 1957

1. BOIVIN, B. Les familles de Trachéophytes. Bull. Soc. Bot. Fr. **103**, 490-505 (1956).
2. BOIVIN, B. Notulae Taxonomicae — II. *Glaux maritima* Linné, (Primulaceae) Bull. Soc. Roy. Bot. Belg. **88**, 9-11 (1956).
3. BOIVIN, B. Etudes Thalictrologiques — I. *Thalictra varia* (Ranunculaceae) Bull. Soc. Bot. Belg. **88**, 35-38 (1956).
4. BOSHER, J. E. The propagation of root-rot-free strawberry and trailing cane fruit plants. Plant Disease Reptr. **40** (8), 739-740 (1956). (van Aldrichem, M. C. J. and Bosher, J. E.).
5. CAMPBELL, W. P. The influence of associated microorganisms on the pathogenicity of *Helminthosporium sativum*. Can. J. Botany, **34** (6), 865-874 (1956).
6. CAMPBELL, W. P. Studies on ergot infection in gramineous hosts. Can. J. Botany, **35** (3), 315-320 (1957).
7. CHEREWICK, W. J. Further improvements in the partial-vacuum method of inoculation with loose smut fungi. Phytopathology, **46** (7), 355-358 (1956). (Cherewick, W. J. and Cunningham, R. H.).
8. CHEREWICK, W. J. Methods for inoculating barley and oats with seedling-infecting smut fungi. Abstr. Phytopathology, **47** (1), 6 (1957).
9. CHEREWICK W. J. Genetics of seedling-infecting oats and barley smuts. *In* Minutes of the Twenty-fifth Meeting of the Assoc. Committee on Plant Diseases. 1957. (Mimeographed).
10. CINQ-MARS, L. (See 77).
11. CONNERS, I. L. Canadian Plant Disease Survey Ann. Rept. 35, pp. i-xxi, 1-130. 1956.
12. CORMACK, M. W. Occurrence of the bacterial wilt organism in alfalfa seed. Phytopathology, **46** (7), 407-409 (1956). (Cormack, M. W. and Moffatt, J. E.).
13. CORMACK, M. W. Studies on methods and materials for testing alfalfa for resistance to bacterial wilt. Can. J. Plant Sci. **37** (1), 1-11 (1957). (Cormack, M. W., Peake, R. W. and Downey, R. K.).
14. CREELMAN, D. W. The unusual occurrence of three leaf-spotting fungi on grasses in Nova Scotia. Plant Disease Reptr. **40** (6), 510-512 (1956).
15. CREELMAN, D. W. The occurrence of ash rust in western Nova Scotia. Plant Disease Reptr. **40** (6), 580 (1956).
16. CREELMAN, D. W. Spot anthracnose of linden. Mycologia, **48** (4), 552-557 (1956).
17. GENEREUX H. La résistance des variétés de pommes de terre au mildiou. Agriculture, **14** (1), 13-15 (1957).
18. GORDON, W. L. The occurrence of *Fusarium* species in Canada V. Taxonomy and geographic distribution of *Fusarium* species in soil. Can. J. Botany, **34** (6), 833-846 (1956).
19. GORDON, W. L. The taxonomy and habitats of the *Fusarium* species in Trinidad, B. W. I. Can. J. Botany, **34** (6), 847-864 (1956).
20. GREEN, G. J. Pathological histology and varietal reactions in Septoria leaf blotch of barley. Phytopathology, **47** (2), 73-79 (1957). (Green, G. J. and Dickson, J. G.).
21. HANNA, W. F. Genetics in relation to crop protection. Proceedings of the Second International Conference on Plant Protection, 1956, at Fernhurst Research Station, England. Butterworths Scientific Publications, London, 1957.

22. HRUSHOVETZ, S. B. Cytological studies of ascus development in *Cochliobolus sativus*. Can. J. Botany, **34** (4), 641-651 (1956).

23. HRUSHOVETZ, S. B. and LEBEAU, J. B. Production of leaf chlorosis in red clover by the addition of chemicals to the soil. Plant Disease Reptr. **41** (2), 120-122 (1957). (Hrushovetz, S. B., Lebeau, J. B. and Stelfox, H. B.).

24. HRUSHOVETZ, S. B. Effect of amino acids on the virulence of *Helminthosporium sativum* to wheat seedlings. Phytopathology, **47** (5), 261-264 (1957).

25. LEBEAU, J. B. (See 23).

26. LUDWIG, R. A. (See 47).

27. MACRAE, R. (See 36).

28. McDONALD, W. C. (See 52).

29. McKEEN, C. D. The inhibitory activity of extract of *Capsicum frutescens* on plant virus infections. Can. J. Botany, **34** (6), 891-903 (1956).

30. McKEEN, C. D. Phomopsis black rot of cucurbits. Can. J. Botany, **35** (1), 43-50 (1957).

31. MELLOR, F. C. (See 64).

32. MILLAR, R. L. (See 78).

33. MILLER, J. J. The metabolism of yeast sporulation. I. Effect of certain metabolites and inhibitors. Can. J. Microbiol. 2 (6), 519-537 (1956). (Miller, J. J. and Halpern, C.).

34. NEWTON, W. The nutrition of *Phytophthora*. Can. J. Botany, **34** (5), 751-757 (1956). (Lopatecki, L. E. and Newton, W.).

35. NEWTON, W. The nonutilization of *d*-alanine and growth stimulation by *l*-alanine in the nutrition of *Phytophthora parasitica*. Can. J. Botany, **34** (5), 759-761 (1956).

36. NOBLES, M. K. and MACRAE, R. Results of interfertility tests on some species of Hymenomycetes. Can. J. Botany, **35** (3), 377-387 (1957). (Nobles, M. K., Macrae, R. and Tomlin, B. P.).

37. NORDIN, V. J. Heart rots in relation to the management of spruce in Alberta. Forestry Chronicle, **32** (1), 79-85 (1956).

38. NORDIN, V. J. Insects associated with fire-scarred lodgepole pine in Alberta. Can. Dept. Agr. Forest Biol. Div. Bi-monthly Progr. Rept. **12** (6), 3 (1956).

39. NORDIN, V. J. Red stain in lodgepole pine. Can. Dept Agr. Forest Biol. Div. Bi-monthly Progr. Rept. **13** (1), 3 (1957). (Nordin, V. J. and Carmichael, E. J.).

40. NORDIN, V. J. Diseases of lodgepole pine in Alberta. Can. Dept. Agr. Forest Biology Div. 1957. (Mimeographed).

41. PAQUIN, R. The effect of *Fusarium* toxins on the enzymic activity of tomato hypocotyl mitochondria. Can. J. Botany, **35** (2), 207-218 (1957). (Paquin, R. and Waygood, E. R.).

42. PARMELEE, J. A. (See 53).

43. REDMOND, D. R. Decay in balsam fir arising through spruce budworm injury. Can. Dept. Agr. Forest Biol. Div. Bi-monthly Progr. Rept. **12** (4), 1-2 (1956). (Stillwell, M. A. and Redmond, D. R.).

44. REDMOND, D. R. The future of birch from the viewpoint of diseases and insects. Forestry Chronicle, **33** (1), 25-30 (1957).

45. REDMOND, D. R. Infection courts of butt-rotting fungi in balsam fir. Forest Science, **3**, 15-21 (1957).

46. RICHARDSON, J. K. (See 77).

47. ROSS, R. G. and LUDWIG, R.A. A comparative study of fungitoxicity and phytotoxicity in an homologous series of N-*n*-alkylethylenethioureas. Can. J. Botany, **35** (1), 65-95 (1957).

48. SACKSTON, W. E. Rust as a factor in sunflower production. Abstr. Phytopathology, **46** (1), 25 (1956). (Sackston, W. E. and Putt, E. D.).

49. SACKSTON, W. E. Forms and races of *Puccinia helianthi.* Abstr. Phytopathology, **46** (1), 25 (1956).

50. SACKSTON, W. E. Observations and speculations on rust (*Puccinia helianthi* Schw.) and some other diseases of sunflowers in Chile. Plant Disease Reptr. **40** (8), 744-747 (1956).

51. SACKSTON, W. E. Studies on sunflower rust. I. Some sources of rust resistance. Can. J. Plant Sci. **37** (1), 43-54 (1957). (Putt, E. D. and Sackston, W. E.).

52. SACKSTON, W. E. and McDONALD, W. C. Leaf mottle or verticillium wilt of sunflower. Plant Disease Reptr. **41** (4), 337-343 (1957). (Sackston, W. E., McDonald, W. C. and Martens, J.).

53. SAVILE, D. B. O. and PARMELEE, J. A. Some fungal parasites of Portulacaceae. Mycologia, **48** (4), 573-590 (1956).

54. SAVILE, D. B. O. Review of *Travels and traditions of waterfowl* by H. A. Hochbaum. Can. Field-Nat. **70** (3), 146-147 (1956).

55. SAVILE, D. B. O. Known dispersal rates and migratory potentials as clues to the origin of the North American biota. Am. Midland Naturalist, **56** (2), 434-453 (1956).

56. SAVILE, D. B. O. Review of *Annual Report for 1955 of the Denver Museum of Natural History.* Can. Field-Nat. **70** (4), 186 (1956).

57. SAVILE, D. B. O. Additions to the parasitic fungi of Nova Scotia. Can. J. Botany, **35** (2), 197-206 (1957).

58. SAVILE, D. B. O. Notes on boreal Ustilaginales, II. Can. J. Botany, **35** (3), 279-286 (1957).

59. SAVILE, D. B. O. Some recent Ottawa bird records. Can. Field-Nat. **71** (1), 32-33 (1957).

60. SAVILE, D. B. O. The primaries of *Archaeopteryx.* Auk, **74**, 99-101 (1957).

61. SHOEMAKER, R. A. Atkinson's species of *Helminthosporium* on grasses from Alabama. Can. J. Botany, **35** (3), 269-277 (1957).

62. SKOROPAD, W. P. The influence of amino acids on the growth of two strains of *Helminthosporium gramineum.* Phytopathology, **47** (5), 249-252 (1957). (Skoropad, W. P. and Arny, D. C.).

63. STACE-SMITH, R. Studies on rubus virus diseases in British Columbia. III. Separation of components of raspberry mosaic. Can. J. Botany, **34** (4), 435-442 (1956).

64. STACE-SMITH, R. and MELLOR, F. C. Studies on rubus diseases in British Columbia, IV. Transmission of raspberry mosaic viruses to *Fragaria vesca* L. Can. J. Botany, **35** (3), 287-290 (1957).

65. VAARTAJA, O. and WHITNEY, R. D. Spread of "red patch" disease. Can. Dept. Agr. Forest Biol. Div. Bi-Monthly Progr. Rept. **12** (3), 3 (1956).

66. VAARTAJA, O. Damping-off pathogens of conifers and caragana in Saskatchewan. Phytopathology, **46** (7), 391-397 (1956). (Vaartaja, O. and Cram, W. H.).

67. VAARTAJA, O. Rate and timing of fungicidal soil treatments. Phytopathology, **47** (3), 169-173 (1957). (Cram, W. H. and Vaartaja, O).

68. VAARTAJA, O. The susceptibility of seedlings of various tree species to *Phytophthora cactorum*. Can. Dept. Agr. Forest Biol. Div. Bi-Monthly Progr. Rept. **13** (2), 2 (1957).

69. VAARTAJA, O. Notes on damping-off in the prairie nurseries in 1956. Can. Dept. Agr. Forest Biol. Div. Bi-Monthly Progr. Rept. **13** (1), 3 (1957).

70. VAARTAJA, O. Notes on low temperature fungi. Can. Dept. Agr. Forest Biol. Div. Bi-Monthly Progr. Rept. **12** (4), 3 (1956).

71. VAARTAJA, O. Damping-off control by antibiotic plant substances. Can. Dept. Agr. Forest Biol. Div. Bi-Monthly Progr. Rept. **13** (2), 2 (1957).

72. VAARTAJA, O. Photoperiodic responses in seedlings of northern tree species. Can. J. Botany, **35** (2), 133-138 (1957).

73. VAARTAJA, O. Photoperiodic response in germination of seed of certain trees. Can. J. Botany, **34** (3), 377-388 (1956).

74. VAARTAJA, O. Screening fungicides for controlling damping-off of tree seedlings. Phytopathology, **46** (7), 387-390 (1956).

75. VAARTAJA, O. Principles and present status of chemical control of seedling diseases. Forestry Chronicle, **32** (1), 45-48 (1956).

76. WALLEN, V. R. Field beans in Canada. Canada Dept. of Agriculture, Publication 988, December 1956, 14 pages. (Fraser, J. G. C. and Wallen, V. R.).

77. WALLEN, V. R., RICHARDSON, J. K. and CINQ-MARS, L. Treatment of vegetable seed for improved emergence — 1956. Plant Disease Reptr. **41** (5), 468-473 (1957). (Wallen, V. R., Richardson, J. K., Cinq-Mars, L. and Bell, W.).

78. WALLEN, V. R. and MILLAR, R. L. The systemic activity of cycloheximide in wheat seedlings Phytopathology, **47** (5), 291-294, (1957).

79. WEINTRAUB, M. (See 81).

80. WHITNEY, R. D. (See 65).

81. WILLISON, R. S. and WEINTRAUB, M. Purification and electron microscopy of viruses causing cherry yellows and related diseases. Can. J. Botany, **34** (1), 86-103 (1956). (Willison, R. S., Weintraub, M. and Ferguson, J. D.).

82. WILLISON, R. S. Fruit flies and fungal wastage in peaches. Can. J. Agr. Sci. **36** (3), 233-240 (1956). (Willison, R. S. and Dustan, G. G.).

83. WILLISON, R. S. Probing the secrets of stone-fruit viruses. Research for Farmers (Can. Dept. Agr.) **2** (2), 7-8, 11 (1957).

84. WRIGHT, N. S. Strain inter-action of potato witches' broom virus. Abstr. Am. Potato J. **34** (3), 82-83 (1957).

85. YARWOOD, C. E. Mechanical transmission of plant viruses. Adv. in Virus Research **4**, 243-278 (1956).

86. YARWOOD, C. E. Obligate parasitism. Ann. Rev. Plant Physiol. **7**, 115-142 (1956).

87. YARWOOD, C. E. Heat-induced susceptibility of beans to some viruses and fungi. Phytopathology, **46** (9), 523-525 (1956).

88. YARWOOD, C. E. Cross protection with two rust fungi. Phytopathology, **46** (10), 540-544 (1956).

89. YARWOOD, C. E. Juice transmission of viruses to peach. Abstr. Phytopathology, **47** (1), 38 (1957).

90. YARWOOD, C. E. Heat activation of some virus infections. Abstr. Phytopathology, **47** (1), 38 (1957).

91. YARWOOD, C. E. Powdery mildews. Botan. Rev. **23** (4), 235-301 (1957).